

(No Model.)

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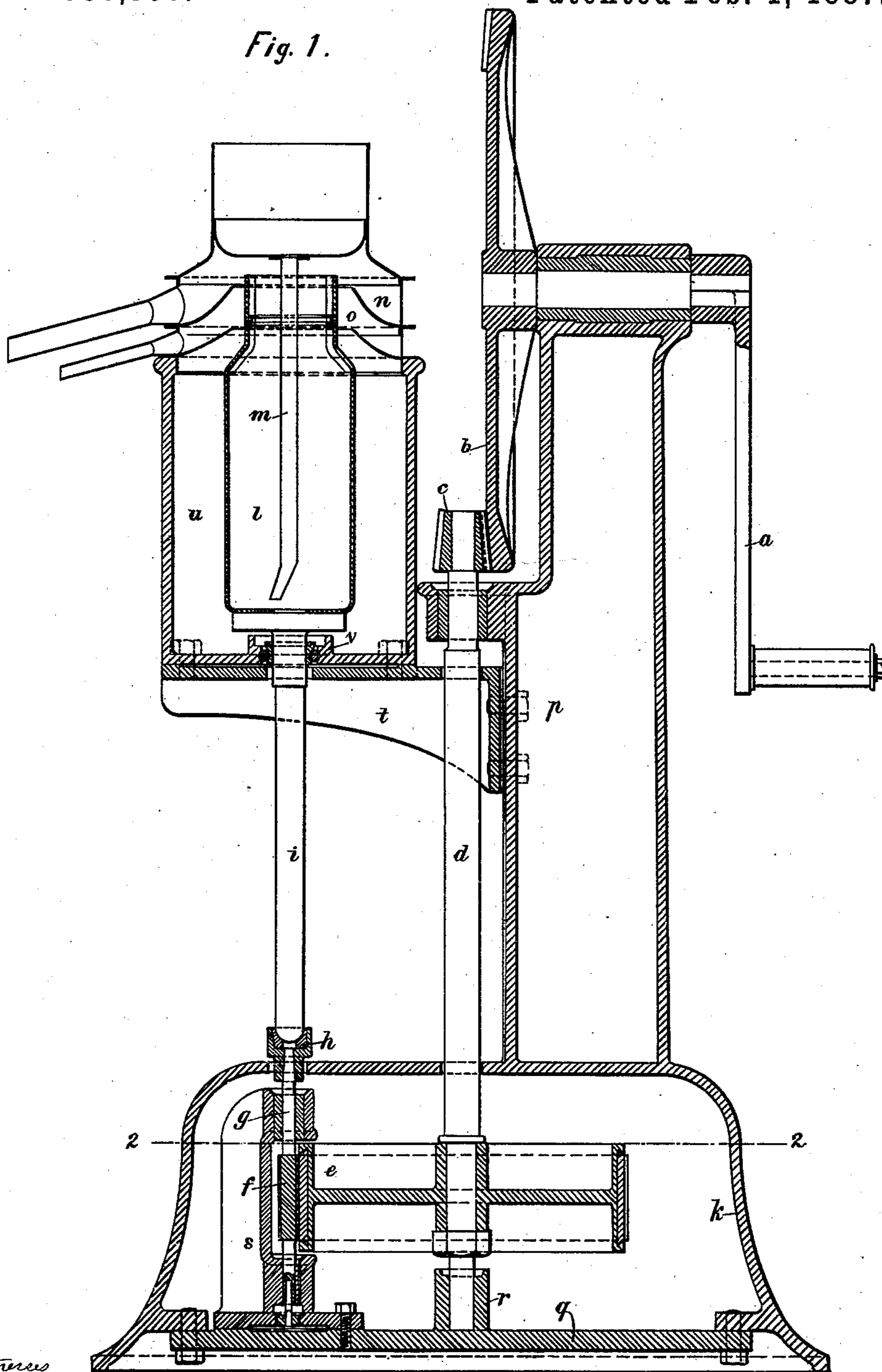
G. DE LAVAL.

MOTOR FOR OPERATING CENTRIFUGAL MACHINES.

No. 356,990.

Patented Feb. 1, 1887.

Fig. 1.



Witness

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Fig. 2.

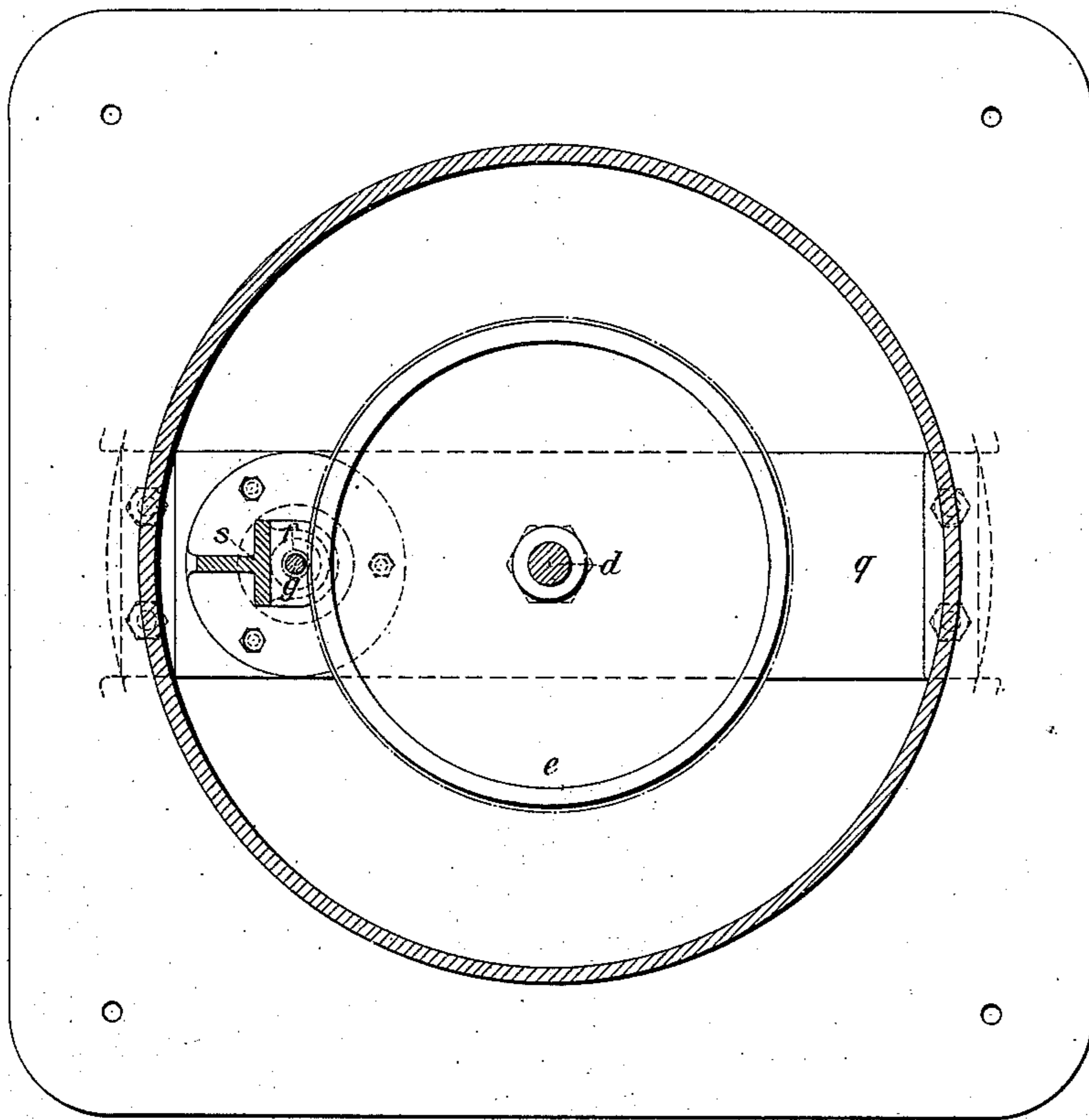
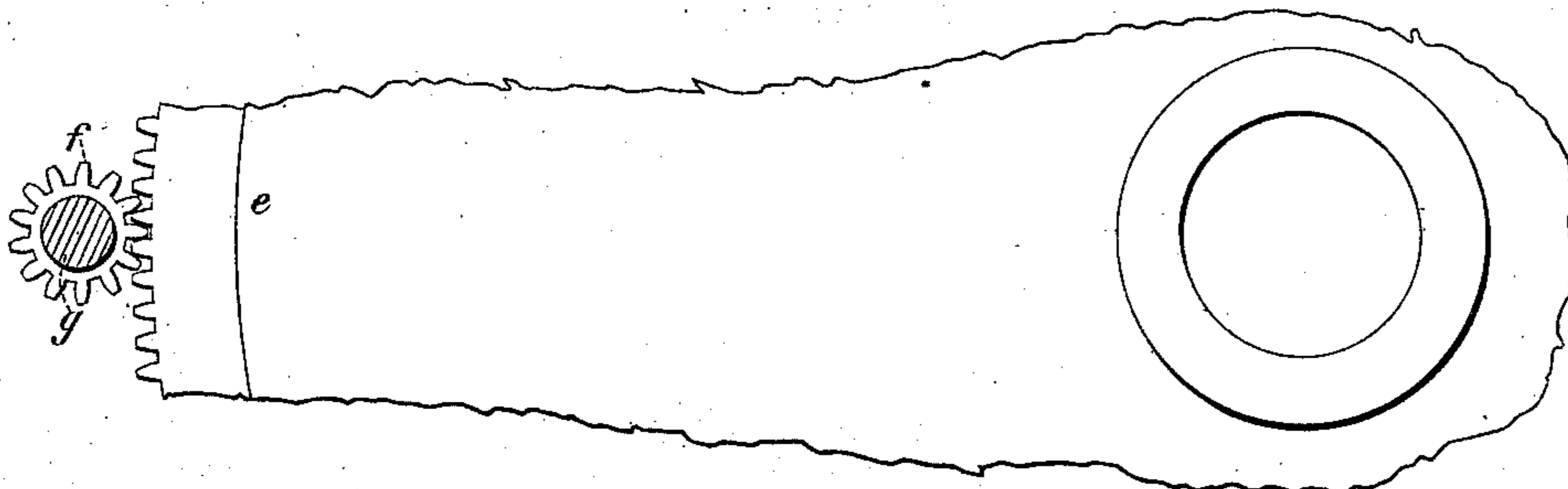


Fig. 3.



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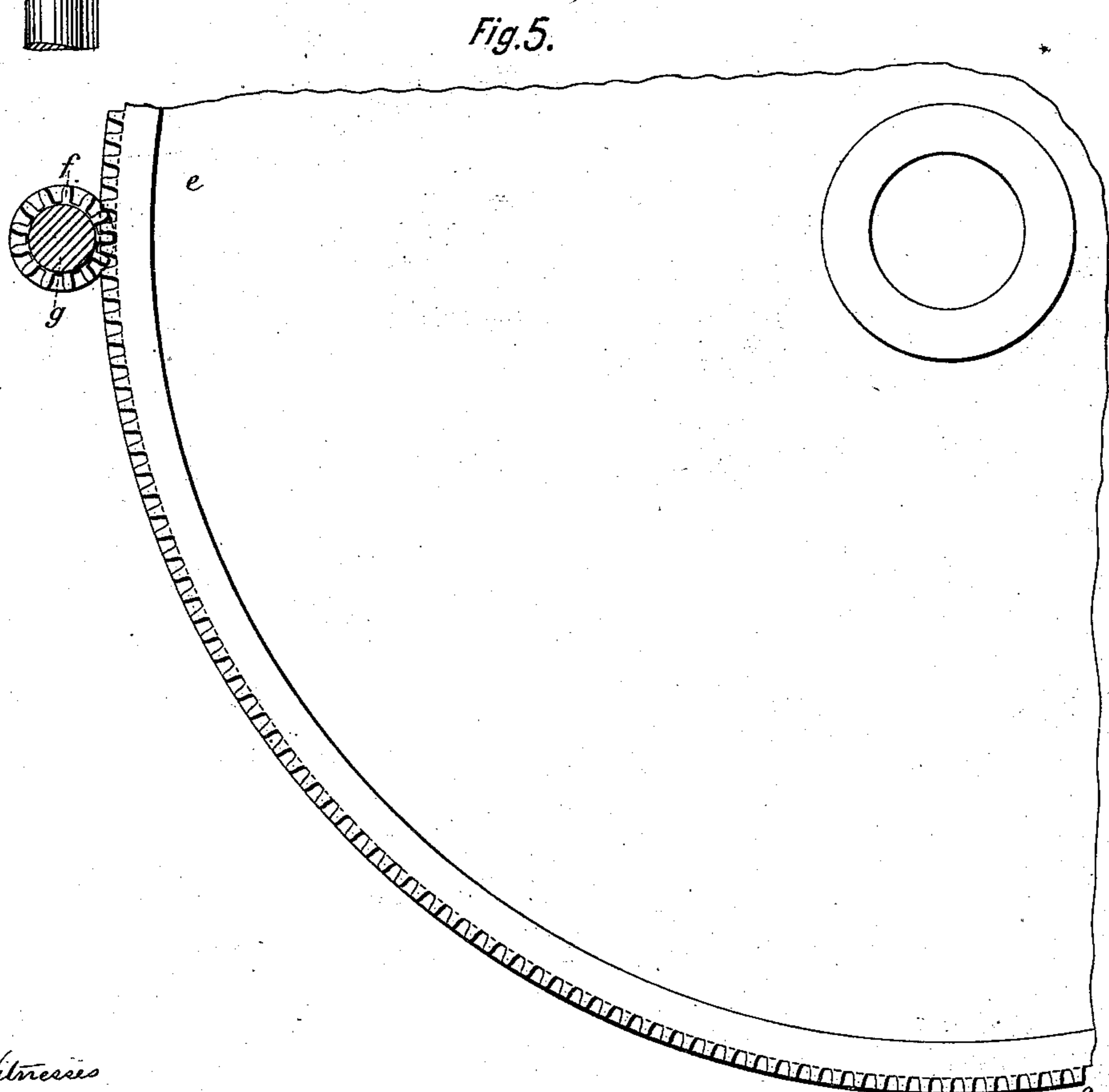
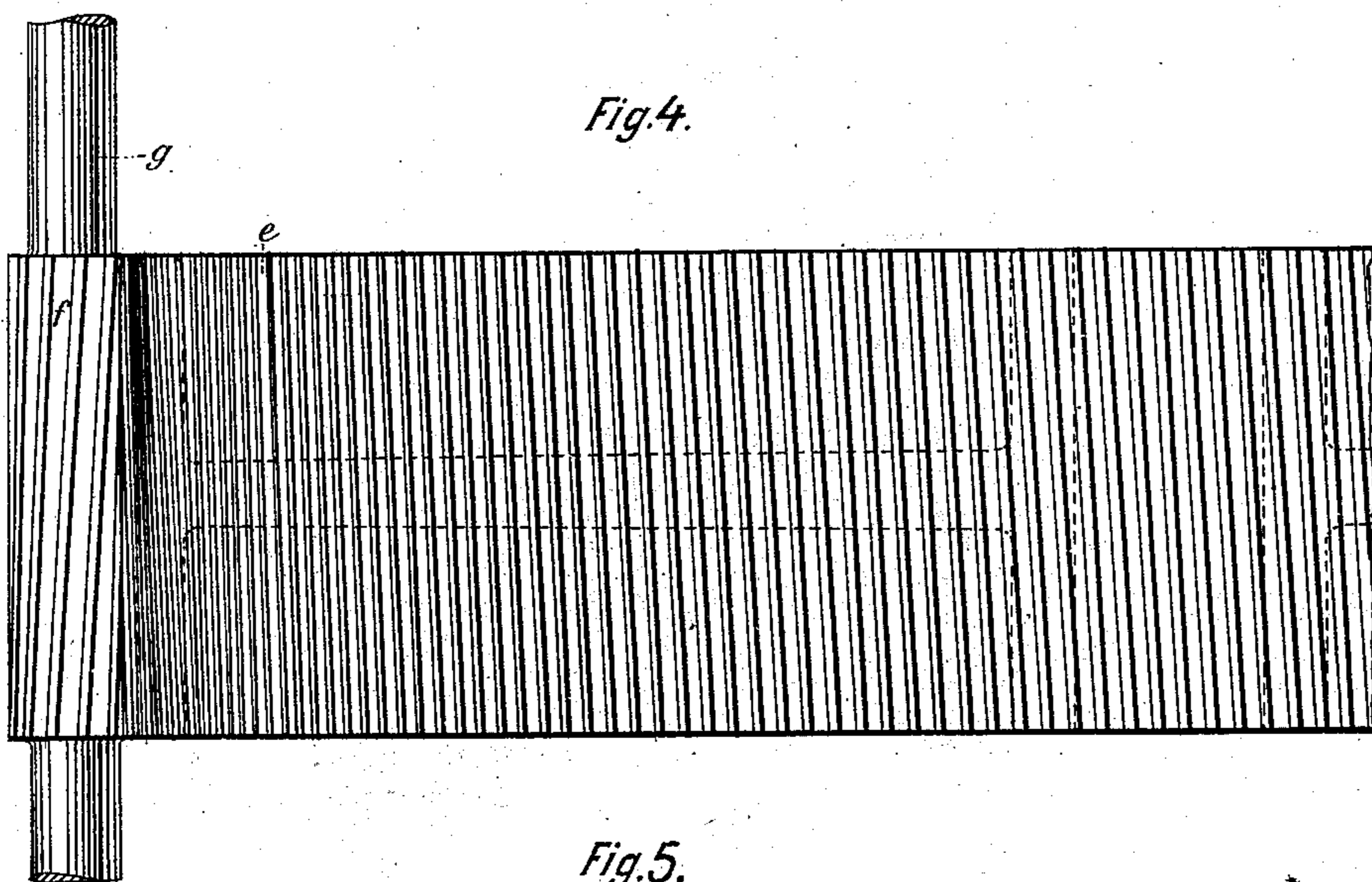
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UNITED STATES PATENT OFFICE.

GUSTAF DE LAVAL, OF STOCKHOLM, SWEDEN.

MOTOR FOR OPERATING CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 356,990, dated February 1, 1887.

Application filed October 2, 1886. Serial No. 215,118. (No model.)

To all whom it may concern:

Be it known that I, GUSTAF DE LAVAL, a subject of the King of Sweden, and a resident of Stockholm, Sweden, have invented a new and useful Improvement in Motors for Operating Centrifugal Machines, such as Cream-Separators and the like, of which the following is a specification.

The object of this invention is to provide a practical and compact apparatus for supporting and operating vertically-mounted centrifugal machines—such as cream-separators, emulsifiers, and the like—by hand-power, the arrangement being such as to enable very rapid rotary motion to be imparted to such machines by the turning of a handle at moderate speed.

In the accompanying drawings, Figure 1 is a vertical section of the apparatus according to this invention applied to a De Laval cream-separator, and Fig. 2 a horizontal section on the line 2 2 of Fig. 1. Fig. 3 represents the pinion and a part of the driving-wheel of the spur-gearing in plan. Figs. 4 and 5 show in elevation and plan a modified form of pinion and driving-wheel with teeth oblique or inclined instead of straight or parallel to the axis. Figs. 3 to 5 are drawn in full size; but the dimensions may, however, be varied.

a is a crank.

b c are bevel-gearing, by which the motion is transferred from the crank-handle to the upright shaft *d*.

e f is spur-gearing, with teeth straight or oblique—that is, parallel or inclined to the axis of the respective wheels—for transmitting the motion from the shaft *d* to the shaft *g*. This latter shaft is connected by a coupling, *h*, to the shaft *i* of the cream-separator *l*.

m is the inlet-pipe for the milk, and *n o* are the ordinary receptacles for the cream and the skimmed milk.

p is the stand; *k*, its base; *q*, a plate supporting the step *r* and the frame *s* of the bearings for the shaft *g*.

t is a bracket supporting a casing, *u*, surrounding the rotary vessel of the separator. The bottom of the casing *u* is represented as provided with a bearing, *v*, for the shaft *i*; but this bearing may be arranged in the bracket,

if preferred. The lower end of the shaft *i* is rounding, and rests within a leather or other suitable lining inside the cup *h* on the top of the shaft *g*, so as to form a friction-coupling for stopping and starting the centrifugal machine gradually.

In using the apparatus the crank *a* is turned, and by the gearing a rapid rotary motion is imparted to the shaft *i* and to the apparatus connected therewith.

Although there are only two pairs of toothed wheels in this apparatus, the necessary speed can be imparted to the shaft *i* without turning the crank *a* more than about thirty revolutions a minute. Nevertheless the stand is of small dimensions. The gearing *e f* is preferably provided with very small teeth, such as illustrated—that is to say, the gearing pitch is less to cause the teeth to work together without jar or concussion. This gearing, which is located in the lower part of the stand, and is, in the example shown in the drawings, entirely inclosed in the base of the stand, imparts to the apparatus nearly eighteen and a half revolutions for every revolution of the shaft *d*, or when the shaft *d* makes three hundred and eighty revolutions the shaft *g* or *i*, situated less than seven and seven-eighths inches apart from *d*, makes more than seven thousand revolutions.

I claim as my invention—

1. The combination, with the vertical shaft *i*, of the hollow base *k*, the vertical standard *p*, the bracket *t*, extending out from the side of the standard and containing the bearing for the shaft *i* and supporting the casing *u*, the bearing at the lower end of the shaft, and a small pinion, *f*, with fine teeth thereon, the wheel *e* within the base *k*, gearing into the pinion *f*, the vertical shaft *d* and bearings for the same, the bevel-pinion *c* and bevel-wheel *b* and the crank *a*, and the shaft in bearings at the top of the standard *p* and connecting the crank and bevel-gear, substantially as specified.

2. The combination, with the vertical shaft *i*, of the hollow base *k*, the vertical standard *p*, the bracket *t*, extending out from the side of the standard and containing the bearing for the shaft *i*, the shaft *g*, coupled to the shaft *i*, and a

small pinion, *f*, with fine teeth thereon, and the bearings within the hollow base for the shaft *g*, the wheel *e* within the base *k*, gearing into the pinion *f*, the vertical shaft *d* and bearings 5 for the same, the bevel-pinion *c* and bevel-wheel *b* and the crank *a*, and the shaft in bearings at the top of the standard *p* and connecting the crank and bevel-gear, substantially as specified.

Signed by me this 28th day of August, A. D. 1886.

GUSTAF DE LAVAL.

Witnesses:

AUG. MALMBERG,

OTTO NILSON.

Both of Stockholm.